

WHAT IS CLAIMED IS:

1. A method for forming an arrangement of two barrier layers on a substrate, comprising:

forming a first ceramic barrier layer on a substrate, wherein the first ceramic barrier layer has a first surface and a second surface and the first surface is closer to the substrate than the second surface;

modifying at least a portion of the second surface of the first ceramic barrier layer to introduce first nucleation sites on the second surface; and

forming a second ceramic barrier layer on the first ceramic barrier layer, wherein the second ceramic barrier layer is initiated at the first nucleation sites.

2. The method of claim 1, wherein:

modifying at least a portion of the second surface of the first ceramic barrier layer includes chemically modifying the second surface.

3. The method of claim 2, wherein:

chemically modifying at least a portion of the second surface of the first ceramic barrier layer includes at least one modification techniques from the group consisting of acid treatment, base treatment, exposure to water vapor, plasma treatment and ozone treatment.

4. The method of claim 1, wherein:

modifying at least a portion of the second surface of the first ceramic barrier layer includes mechanically modifying the second surface.

5. The method of claim 4, wherein:

mechanically modifying at least a portion of the second surface of the first ceramic barrier layer includes at least one modification techniques from the group consisting of ion milling, nano-grinding, melting the second surface with a laser and tempering.

6. The method of claim 1, wherein:
modifying at least a portion of the second surface of the first ceramic barrier layer includes forming a nucleation promoting material on the second surface.

5 7. The method of claim 1, wherein:
forming a nucleation promoting material on at least a portion of the second surface of the first ceramic barrier layer includes forming at least one material from the group consisting of a metal, a metal nitride and a metal oxide.

10 8. The method of claim 7, wherein:
forming the at least one material includes applying a material with a critical nucleus of one atom.

15 9. The method of claim 8, wherein:
forming the at least one material includes applying at least one material from the group consisting of tantalum, chromium, tungsten, molybdenum, niobium, tantalum nitride, titanium nitride, tantalum oxide and titanium oxide.

20 10. The method of claim 7, wherein:
applying the at least one material includes applying a material with a critical nucleus of one molecule.

25 11. The method of claim 10, wherein:
forming at least one material includes applying at least one of the materials from the group consisting of tantalum, chromium, tungsten, molybdenum, niobium, tantalum nitride, titanium nitride, tantalum oxide and titanium oxide.

12. The method of claim 1, wherein:

forming a first ceramic barrier layer and a second ceramic barrier layer includes forming the first and second ceramic barrier layers of at least one material from the group consisting of a metal nitride, a metal oxide and a metal oxynitride.

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13. The method of claim 12, wherein:

the metal is aluminum.

14. The method of claim 1, wherein:

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forming a first ceramic barrier layer and a second ceramic barrier layer includes forming the first and second ceramic barrier layers of at least one if possible material from the group consisting of silicon nitride, silicon oxide and silicon oxynitride.

15. The method of claim 1, wherein:

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forming a second ceramic barrier layer includes depositing the second ceramic barrier layer using chemical vapor deposition.

16. The method of claim 1, wherein:

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forming a second ceramic barrier layer includes depositing the second ceramic barrier layer using physical vapor deposition.

17. The method of claim 1, wherein:

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forming the first ceramic barrier layer includes at least one technique selected from the group consisting of laminating, printing, sputtering, spraying, chemical vapor deposition and physical vapor deposition.

18. The method of claim 1, wherein:

the substrate includes a flexible transparent substrate.

19. The method of claim 1, wherein the second ceramic barrier layer has a first surface and a second surface and the first surface of the second ceramic barrier layer is closer than the second surface to the first ceramic barrier layer, the method further comprising:

5 modifying at least a portion of the second surface to introduce second nucleation sites on the second surface of the second ceramic barrier layer; and

forming a third ceramic barrier layer on the second ceramic barrier layer, wherein the third ceramic barrier layer is initiated at the second nucleation sites.

10 20. The method of claim 1, wherein:
forming a first ceramic barrier layer includes forming the layer to be between about 1 and about 250 nanometers thick.

15 21. The method of claim 1, wherein:
forming a second ceramic barrier layer includes forming the layer to be between about 1 and about 250 nanometers thick.

20 22. The method of claim 1, wherein:
forming a first ceramic barrier layer includes forming the layer to be between about 10 and about 100 nanometers thick.

25 23. The method of claim 1, wherein:
forming a second ceramic barrier layer includes forming the layer to be between about 10 and about 100 nanometers thick.

24. The method of claim 1, further comprising:
forming an organic electrical device on the second ceramic barrier layer.

30 25. The method of claim 1, further comprising:
forming a first electrically conductive layer on the second ceramic barrier layer;

forming a functional organic layer on the first electrically conductive layer; and
forming a second electrically conductive layer on the functional organic layer.

26. The method of claim 25, further comprising:

5 forming an encapsulation over the second electrically conductive layer such that
the functional organic layer is sealed from the environment by the encapsulation.

27. The method of claim 26, wherein forming an encapsulating comprises:

forming a third ceramic barrier layer over the second electrically conductive layer,
10 wherein the third ceramic barrier layer has a first surface and a second surface and the
first surface is closer than the second surface to the second electrically conductive layer;

modifying the second surface of the third ceramic barrier layer to introduce
second nucleation sites on the surface of the third ceramic barrier layer; and

forming a fourth ceramic barrier layer on the third ceramic barrier layer, wherein
15 the fourth ceramic barrier layer is initiated at the second nucleation sites.